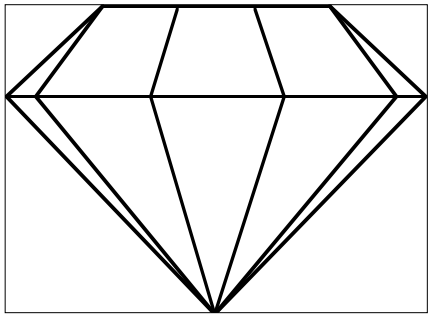
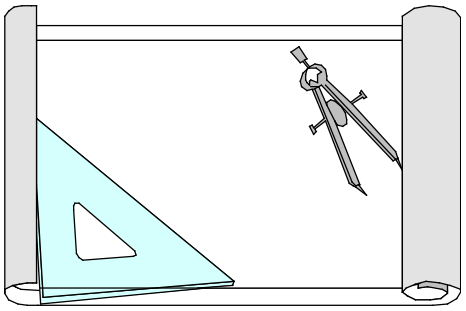
An introduction to

Understanding by Design

September 13, 2010





presented by

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Key Understandings about...

-- *Understanding* --

• A primary goal of education is the development and deepening of student understanding of important ideas and processes in the disciplines.

• Content needs to be "unpacked" to identify the big ideas worth understanding and the essential questions worth uncovering.

• Evidence of student understanding is revealed when students apply (transfer) their learning within authentic contexts.

• Six facets of understanding – the capacity to explain, interpret, apply, shift perspective, empathize, and self-assess – serve as indicators that students understand.

• Understanding must be "earned" by the learner. Teaching for understanding facilitates "meaning making" by the students and equips them to successfully transfer their learning.

-- *Design* --

• Effective curriculum development reflects a three-stage design process called "backward design." This process helps to insure that curriculum plans are well aligned and focused on desired learnings. Backward curriculum design also helps avoid the twin problems of "textbook coverage" and "activity-oriented" teaching.

• The backward design process can be productively applied to planning a single unit, a year-long course, and an entire K-12 curriculum.

• Regular reviews of curriculum and assessment designs, based on design standards, are needed for quality control to avoid the most common design mistakes and disappointing results.

• Educators can "work smarter" in curriculum design by working collaboratively and sharing ideas via electronic networks (e.g., the ubdexchange.org web site).

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UbD in a Nutshell

Guiding Principles of Understanding by Design

1. UbD is a way of thinking purposefully about curricular planning and school reform. It offers a 3-stage design process, a set of helpful design tools, and design standards – not a rigid program or prescriptive recipe.

2. The primary goal of UbD is student understanding: the ability to make meaning of "big ideas" and transfer learning.

3. UbD "unpacks" and transforms Content Standards into the relevant Stage 1 elements and appropriate assessments in Stage 2.

4. Understanding is revealed when students autonomously transfer their learning through authentic performance. Six facets of understanding – the capacity to *explain, interpret, apply, shift perspective, empathize*, and *self assess* – serve as indicators of understanding.

5. Teachers are coaches of understanding, not mere purveyors of content or activity. They design for and support "meaning making" and "transfer" by the learner; and adjust to achieve intended results.

6. Planning is best done "backward" from the desired results and the transfer tasks that embody the goals. The 3 Stages (Desired Results, Evidence, Learning Plan) must align for the unit to be most effective.

7. Regular reviews of curriculum against design standards enhance curricular quality and effectiveness.

8. UbD reflects a "continuous improvement" approach. The results of curriculum designs – student performance - informs needed adjustments.

Key Questions of Backward Design

Stage 1: Desired Results

- *What long-term transfer goals are sought?*
- *What meanings should students make in order to arrive at important understandings?*
- *What essential questions will students explore?*
- *What knowledge & skill will students acquire?*
- *What established goals/Standards are targeted?*

Stage 2: Evidence

- *What performances and products will reveal evidence of meaning-making and transfer?*
- *By what criteria will performance be assessed, in light of Stage 1 desired results?*
- *What additional evidence will be collected for all Stage 1 Desired Results?*

Stage 3: Learning Plan

- *What activities, experiences, and lessons will lead to achievement of the desired results and success at the assessments?*
- *How will the learning plan help students of Acquisition, Meaning Making, and Transfer?*
- *How will the unit be sequenced and differentiated to optimize achievement for all learners?*
- *Are all three stages properly aligned?*

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A Summary of Key Research Findings Supporting Understanding by Design

• Views of how effective learning proceeds have shifted from the benefits of diligent drill and practice to focus on students' understanding and application of knowledge.

• Experts' knowledge is organized... Their knowledge is not simply a list of facts and formulas that are relevant to the domain; instead, their knowledge is organized around core concepts or 'big ideas' that guide their thinking about the domain (e.g., Newton's second law of motion); it is "conditionalized" to specify the contexts in which it is applicable; it supports understanding and transfer (to other contexts) rather than only the ability to remember. Novices' knowledge is much less likely to be organized around big ideas; they are more likely to approach problems by searching for correct formulas and pat answers that fit their everyday intuitions.

• Learning must be guided by generalized principles in order to be widely applicable. Knowledge learned at the level of rote memory rarely transfers; transfer most likely occurs when the learner knows and understands underlying principles that can be applied to problems in new contexts. Learning with understanding is more likely to promote transfer than simply memorizing information from a text or a lecture.

• Skills and knowledge must be extended beyond the narrow contexts in which they are initially learned. For example, knowing how to solve a math problem in school may not transfer to solving math problems in other contexts. It is essential for a learner to develop a sense of *when* what has been learned can be used -- the conditions of application. Failure to transfer is often due to learners' lack of this type of conditional knowledge.

• Curricula that are a "mile wide and an inch deep" run the risk of developing disconnected rather than connected knowledge. Research on expertise suggest that a superficial coverage of many topics in the domain may be a poor way to help students develop the competencies that will prepare them for future learning and work."

• Feedback is fundamental to learning, but feedback opportunities are often scarce in classrooms. Students may receive grades on tests and essays, but these are summative assessments that occur at the end of projects. What are needed are formative assessments, which provide students with opportunities to revise and improve the quality of their thinking and understanding.

• Assessments must reflect the learning goals that define various environments. If the goal is to enhance understanding and applicability of knowledge, it is not sufficient to provide assessments that focus primarily on memory for facts and formulas. Many assessments measure only propositional (factual) knowledge and never ask whether students know *when, where,* and *why* to use that knowledge. Given the goal of learning with understanding, assessments and feedback must focus on understanding, and not only on memory for procedures or facts.

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What Is Exemplary Design for Learning?

1. Think back to your many prior experiences with well-designed learning, *both in and out of school*. What was the most **well-designed learning experience** you have ever encountered as a learner? What features of the design - *not* the teacher's style or your interests - made the learning so **engaging and effective**? (Design elements include: challenges posed, sequence of activities, resources provided, assignments, assessments, groupings, site, teacher's role, etc.).
   Briefly describe the design, below:

2. In sharing your recollections and analyses with your colleagues, build **a list of generalizations that follow** from the accounts. What do well-designed learning experiences have in common? In other words, what must be built in "by design" for any learning experience to be maximally **effective** *and* **engaging** for students?

The best designs for learning...

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A 3rd-Grade Social Studies Unit

Topic

Topic: Westward Movement and Pioneer Life
(social studies - 3rd grade)

Activities

a. Read textbook section - "life on the prairie." Answer the end-of-chapter questions.

b. Read and discuss Sarah Plain and Tall. Complete a "word search" puzzle of pioneer vocabulary terms contained in the story.

c. Create a "pioneer life" memory box with artifacts showing what life might be like for a child traveling west or living on the prairie.

d. PRAIRIE DAY activities: Dress in pioneer clothes and complete seven learning stations:

1. churn butter
2. play 19th-century game
3. send letter home w/ sealing wax
4. play "dress the pioneer" computer game
5. make a corn husk doll
6. quilting
7. tin punching

Assessments

a. quiz on pioneer vocabulary terms from Sarah Plain and Tall
b. answers to end-of-chapter questions on pioneer life
c. show and tell for Memory Box contents
d. completion of seven learning stations during Prairie Day
e. student reflections on the unit

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"before" backward design: activity-oriented

Stage 1 – Desired Results

Established Goal(s): G

Topic: Westward Movement and Pioneer Life

Understanding(s): U

Students will understand that...

Essential Question(s):: Q

Students will know... K

- factual information about prairie life
- pioneer vocabulary terms
- the story, Sarah Plain and Tall

Students will be able to... S

Stage 2 – Assessment Evidence

Performance Task(s): T

Other Evidence: OE

a. Show and tell – for the "memory box" and its contents: What would you put in it and why?
b. quiz on pioneer vocabulary from Sarah Plain and Tall
c. answers to factual questions on Sarah Plain and Tall and from the textbook chapter
d. written unit reflection

Stage 3 – Learning Plan

Learning Activities: L

a. Read textbook section - "life on the prairie." Answer the end-of-chapter questions.
b. Read Sarah Plain and Tall. Complete word search on pioneer vocabulary.
c. Create a pioneer life "memory box" with artifacts you might take on a journey to a new life.
d. PRAIRIE DAY activities:
   1. churn butter
   2. play 19th-century game
   3. seal letter w/ sealing wax
   4. play "dress the pioneer" computer game
   5. make a corn husk doll
   6. quilting
   7. tin punching

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"after" backward design

Stage 1 – Desired Results

Established Goal(s): G

2D – explain the lure of the West while comparing the illusions of migrants with the reality of the frontier.

5A – demonstrate understanding of the movements of large groups of people in the U. S. now and long ago.

Source: National Standards for United States History.

Understanding(s): U

Students will understand that...

- Many pioneers had naive ideas about the opportunities and difficulties of moving West.
- People move for a variety of reasons -- for new economic opportunities, greater freedoms or to flee something.
- Successful pioneers rely on courage, ingenuity, and collaboration to overcome hardships and challenges.
- The settlement of the West threatened the lifestyle and culture of Native American tribes living on the plains.

Essential Question(s):: Q

- Why do people move? Why did the pioneers leave their homes to head west?
- How do geography and topography affect travel and settlement?
- Why did some pioneers survive and prosper while others did not?
- What is a pioneer? What is "pioneer spirit"?
- Whose "story" is it?
- Who were the "winners" and who were the "losers" in the settlement of the West?

Students will know... K

- key facts about the westward movement and pioneer life on the prairie
- recognize, define, and use pioneer vocabulary
- basic geography (i.e., the travel routes of pioneers and location of their settlements)
- about Native American tribes living on the plains

Students will be able to... S

- use research skills (with guidance) to find out about life on the wagon train and prairie
- express their findings orally and in writing

Stage 2 – Assessment Evidence

Performance Task(s): T

- Create a museum display, including artifacts, pictures, and diary entries, to "answer" the unit's essential questions.
- Imagine that you are an elderly tribal member who has witnessed the settlement of the plains by the "pioneers." Tell a story to your 8-year old granddaughter about the impact of the settlers on your life. (This performance task may be done orally or in writing.)

Other Evidence: OE

- test on facts about westward expansion, life on the prairie, and basic geography
- drawing(s) showing hardships of pioneer life
- quiz on facts about Native American tribes living on the plains
- Write a letter to a friend "back east" describing your life on the wagon train and the prairie. Tell about your hopes and dreams, then explain what life on the frontier was really like. (Students may also draw pictures and explain orally.)

Stage 3 – Learning Plan

Learning Activities: (selected) L

- Use K-W-L to assess students' prior knowledge and identify learning goals for the unit.
- Revise Prairie Day activities (e.g., substitute Oregon Trail 2 computer simulation for "dress the pioneer" and ask for journal entries while the simulation is played).
- Include other fictional readings linked to the identified content standards/understandings (e.g., Little House on the Prairie, Butter in the Well).
- Create a "timeline map" of a pioneer family's journey west.
- Add non-fiction sources to accommodate various reading levels, such as, Diaries of Pioneer Women, Life on the Oregon Trail and Dakota Dugout. Guide students in researching the period using a variety of resources.
- Review the scoring rubrics for "memory box," museum display, letters, and journals before students begin the performance tasks. Include opportunities for students to study examples of these products.

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"before" backward design: textbook coverage-oriented

Stage 1 – Desired Results

Established Goal(s): G

Topic: Surface Area and Volume (geometry)

Understanding(s): U

Students will understand that...

Essential Question(s):: Q

Students will know... K

- how to calculate surface area and volume for various 3-dimensional figures
- know and use Cavalieri's Principle to compare volumes
- know and use other volume and surface area formulae to compare shapes

Students will be able to... S

Stage 2 – Assessment Evidence

Performance Task(s): T

Other Evidence: OE

a. odd-numbered problems in full Chapter Review, pp. 516-519

b. progress self-test p. 515

c. homework: each 3rd question in sub-chapter reviews and completion of the explorations

Stage 3 – Learning Plan

Learning Activities: L

- Read Chapter 10 in UCSMP Geometry
- Exploration 22, p. 482 – "Containers holding small amounts can be made to appear to hold more than they do by making them long and thin. Give some examples."
- Exploration 25, p. 509 – "Unlike a cone or cylinder, it is impossible to make an accurate Two-dimensional net for a sphere. For this reason, maps of earth are distorted. The Mercator projection is one way to show the earth. How is this projection made?"

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"after" backward design

Stage 1 – Desired Results

Established Goal(s): G

IL MATH 7C3b, 4b: Use models and formulas to find surface areas and volumes
IL MATH 9A: Construct models in 2D/3D; make perspective drawings

Source: Illinois Mathematics Standards

Understanding(s): U

Students will understand that...

- Mathematical models can represent physical phenomena but can also distort. (e.g., Mapping three dimensions onto two may introduce distortions).
- Sometimes the best mathematical answer is not the best solution to "real-world" problems.

Essential Question(s):: Q

- How well can pure mathematics model messy, real-world situations?
- When is the best mathematical answer is not always the best solution to a problem?

Students will know... K

- formulae for calculating surface area and volume
- Cavalieri's Principle

Students will be able to... S

- calculate surface area and volume for various 3-dimensional figures
- use Cavalieri's Principle to compare volumes

Stage 2 – Assessment Evidence

Performance Task(s): T

- Packaging problem: what is the ideal container for shipping bulk quantities of M & M's packages safely and cost-effectively? (Note: the "best" mathematical answer - a sphere - ia not the best solution to this problem.)
- Propose the <u>least controversial</u> two-dimensional map of the world.

Other Evidence: OE

a. odd-numbered problems in full Chapter Review, pp. 516-519

b. progress self-test p. 515

c. homework: each 3rd question in sub-chapter reviews and completion of the explorations

Stage 3 – Learning Plan

Learning Activities: L

(selected)

- Investigate the relationship of surface areas of various containers and volume (e.g. tuna fish cans, cereal boxes, Pringles, candy packages, etc.).
- Investigate different map projections to determine their mathematical accuracy (i.e. degree of distortion).

a. Read Chapter 10 in UCSMP Geometry
b. Exploration 22, p. 504
c. Exploration 22, p. 482
d. Exploration 25, p. 509

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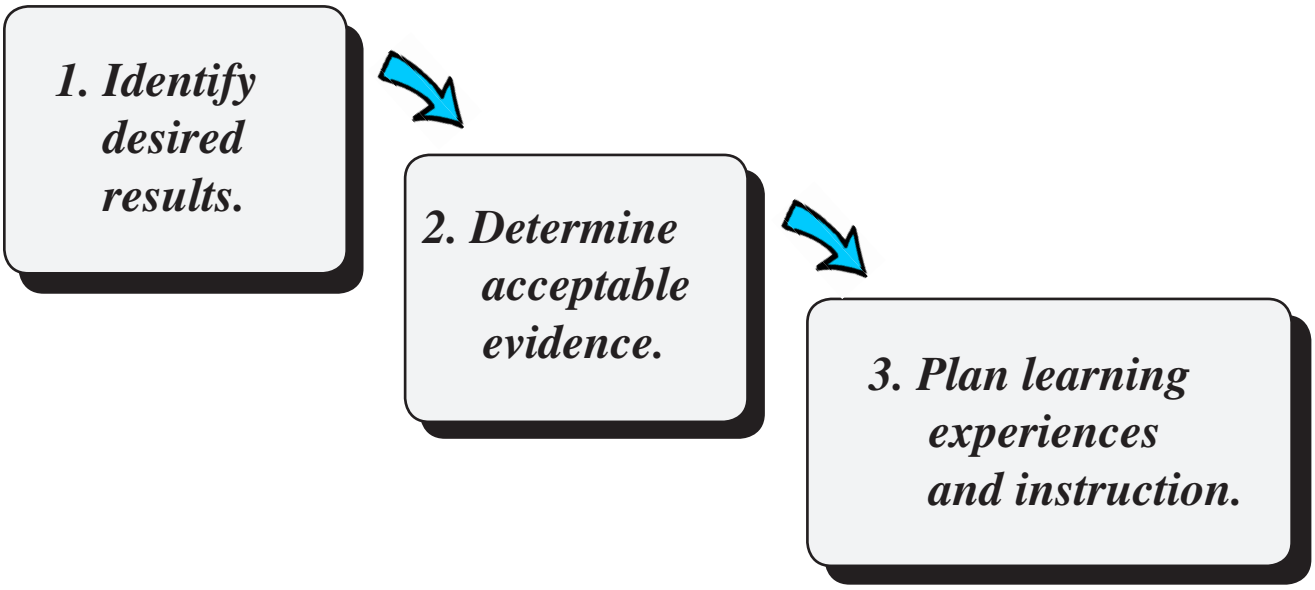
UbD: Stages of "Backward" Design



The backward design approach consists of three general stages:

Stage 1. Identify Desired Results – In stage one we consider the goals. What should students know, understand, and be able to do? What big ideas are worthy of understanding and implied in the established goals (e.g., content standards, curriculum objectives, etc.)? What "enduring" understandings are desired? What provocative questions are worth pursuing to guide student inquiry into these big ideas? What specific knowledge and skills are targeted in the goals and needed for effective performance?

Stage 2. Determine Acceptable Evidence – In the second stage we consider evidence of learning. How will we know if students have achieved the desired results and met the content standards? How will we know that students *really* understand the identified big ideas? What will we accept as evidence of proficiency? The backward design orientation suggests that we think about our design in terms of the collected assessment evidence needed to document and validate that the desired results of Stage 1 have been achieved.

Stage 3. Plan Learning Experiences and Instruction – With identified results and appropriate evidence of understanding in mind, it is *now* time to finalize a plan for the learning activities. What will need to be taught and coached, and how should it best be taught, in light of the performance goals? What sequence of activity best suits the desired results? In planning the learning activities, we consider the WHERETO elements (described later) as guidelines. Those guidelines can be summed up in a question: how will we make learning both engaging *and* effective, given the goals and needed evidence?

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Stage 1 – Desired Results

Established Goal(s): G

Understanding(s): U
Students will understand that...

Essential Question(s):: Q

Students will know... K

Students will be able to... S

Stage 2 – Assessment Evidence

Performance Task(s): T

Other Evidence: OE

Stage 3 – Learning Plan

Learning Activities: L

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Stage 1 – Desired Results

Established Goal(s): G

- *What relevant goals (e.g., Content Standards, Course or Program Objectives, Learning Outcomes etc.) will this design address?*

Understanding(s): U

- *What are the "big ideas"?*
- *What specific understandings about them are desired?*
- *What misunderstandings are predictable?*

Essential Question(s Q

- *What provocative questions will foster inquiry, understanding, and transfer of learning?*

Students will know... K

Students will be able to... S

- *What key knowledge and skills will students acquire as a result of this unit?*
- *What should they eventually be able to do as a result of such knowledge and skill?*

Stage 2 – Assessment Evidence

Performance Task(s): T

- *Through what authentic performance task(s) will students demonstrate the desired understandings?*
- *By what criteria will "performances of understanding" be judged?*

Other Evidence: OE

- *Through what other evidence (e.g. quizzes, tests, academic prompts, observations, homework, journals, etc.) will students demonstrate achievement of the desired results?*
- *How will students reflect upon and self-assess their learning?*

Stage 3 – Learning Plan

Learning Activities: L

- *What learning experiences and instruction will enable students to achieve the desired results? How will the design –*

W= help the students know where the unit is going and what is expected? Help the teacher know where the students are coming from (prior knowledge, interests)?
H = hook all students and hold their interest?
E = equip students, help them experience the key ideas, and explore the issues?
R = provide opportunities to rethink and revise their understandings and work?
E = allow students to evaluate their work and its implications?
T = be tailored (personalized) to the different needs, interests, abilities of learners
O = be organized to maximize initial and sustained engagement as well as effective learning?

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Title: "You Are What You Eat" **Subject/Course:** Health

Topic: nutrition **Grade(s):** 5-7 **Designer(s):** Bob James

Stage 1 – Desired Results

Established Goal(s) (G)

Standard 6 - Students will understand essential concepts about nutrition and diet.
6, a - Students will use an understanding of nutrition to plan appropriate diets for themselves and others.

Understanding(s) (U)

Students will understand that...

- The USDA Food Pyramid presents relative guidelines for nutrition.
- Just because food tastes good, doesn't mean it is good for you.
- Dietary requirements vary for individuals based on age, activity level, weight, and overall health.
- Healthful living requires an individual to act on available information about diet even if it means breaking comfortable habits.

Essential Question(s): (Q)

- What is healthful eating?
- To what extent are you a healthy eater?
- Could a healthy diet for one person be unhealthy for another?
- Why are there so many health problems in the modern world caused by poor nutrition despite all of the available information?

(K)

Students will know...

- key terms - protein, fat, calorie, carbohydrate, cholesterol, etc.
- types of foods in each food group
- USDA Pyramid guidelines
- variables influencing nutritional needs

(S)

Students will be able to...

- read and interpret nutrition information on food labels
- analyze diets for nutritional value
- plan balanced diets for themselves and others

Stage 2 – Assessment Evidence

Performance Task(s) (T)

Summary in G.R.A.S.P.S. form

You Are What You Eat – Students create an illustrated brochure to teach younger children about the importance of good nutrition for healthful living,

Camp Menu – Students develop a 3-day menu for meals and snacks for an upcoming Outdoor Education camp experience. They write a letter to the camp director to explain why their menu should be selected (by showing that it meets the USDA Food Pyramid recommendations, yet tasty enough for the students).

Key Criteria:

- accurate application of nutritional concepts
- clear and thorough explanation

Other Evidence (OE)

Quizzes - on vocabulary, food groups, USDA Food Pyramid
Prompt - Describe two health problems that could arise as a result of poor nutrition and explain how these could be avoided.

2-page Template (1)

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Stage 3 – Learning Plan

Learning Activities: *(samples)*

L

1. Begin with an entry question (Can the foods you eat cause zits?) to hook students into considering the effects of nutrition on their lives. **M**
2. Introduce the essential questions and discuss the culminating unit performance tasks (Chow Down and Eating Action Plan). **M**
3. Note: Key vocabulary terms are introduced as needed by the various learning activities and performance tasks. Students read and discuss relevant selections from the Health textbook to support the learning activities and tasks. As an on-going activity students keep a chart of their daily eating and drinking for later review and evaluation. **A**
4. Present concept attainment lesson on the food groups. Then, have students practice categorizing pictures of foods accordingly. **M**
5. Introduce the Food Pyramid and identify foods in each group. Students work in groups to develop a poster of the Food Pyramid containing cut-out pictures of foods in each group. Display the posters in the classroom or hallway. **A**
6. Give quiz on the Food groups and Food Pyramid (matching format). **E**
7. Review and discuss the nutrition brochure from the USDA. Discussion question: Must everyone follow the same diet in order to be healthy? **A M**
8. Working in cooperative groups, students analyze a hypothetical family*s diet (deliberately unbalanced) and make recommendations for improved nutrition. Teacher observes and coaches students as they work. **M T**
9. Have groups share their diet analyses and discuss as a class. **M**
   (Note: Teacher collects and reviews the diet analyses to look for misunderstandings needing instructional attention.)
10. Each student designs an illustrated nutrition brochure to teach younger children about the importance of good nutrition for healthy living and the problems associated with poor eating. This activity is completed outside of class. **M T**
11. Show and discuss the video, Nutrition and You. Discuss the health problems that result from poor nutrition. **A**
12. Students listen to, and question, a guest speaker (nutritionist from the local hospital) about health problems caused by poor nutrition. **A**
13. Students respond to written prompt: Describe two health problems that could arise as a result of poor nutrition and explain what changes in eating could help to avoid them. (These are collected and graded by teacher.) **A**
14. Teacher models how to read and interpret food label information on nutritional values. Then, have students practice using donated boxes, cans and bottles (empty!). **A**
15. Students work independently to develop the 3-day camp menu. **T**
16. At the conclusion of the unit, students review their completed daily eating chart and self assess the "healthfulness" of their eating. Have they noticed changes? Improvements? Do they notice changes in how they feel and/or their appearance? **M T**
17. Students develop a personal "eating action plan" for healthful eating. These are saved and presented at upcoming student-involved parent conferences. **T**
18. Conclude the unit with student self evaluation regarding their personal eating habits. Have each student develop a personal action plan for their "healthful eating" goal. **M T**

2-page Template (2)

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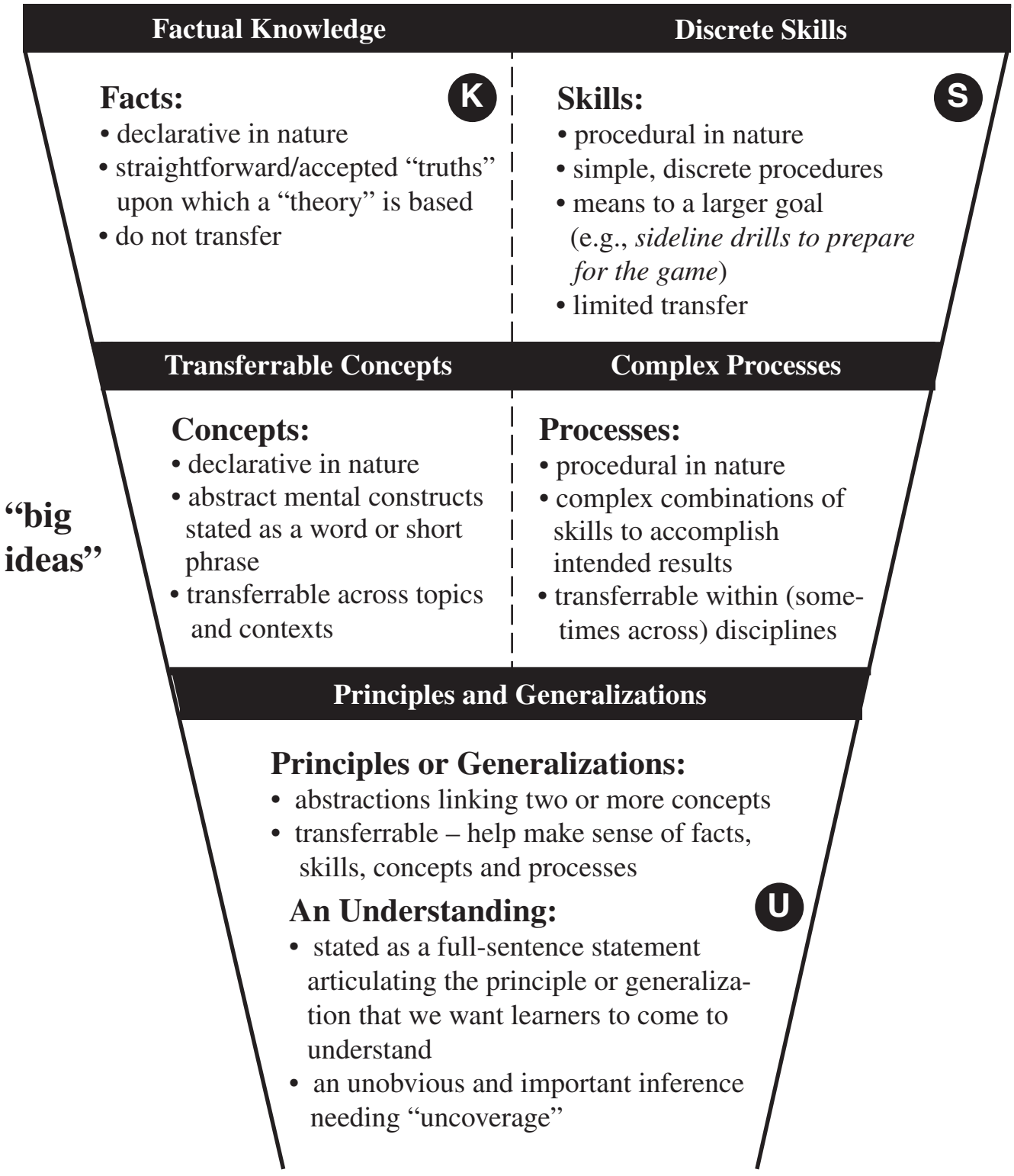
Alignment: The Logic of "Backward Design"

(What do the Desired Results Imply?)

Stage 1	Stage 2	Stage 3
If the desired result is for learners to...	***then, you need evidence of the student's ability to...***	***then, the learning activities need to...***
understand that: (U) • Many pioneers had naive ideas about the opportunities and difficulties of moving West. • People move for a variety of reasons -- for new economic opportunities, greater freedoms or to flee something. • Successful pioneers rely on courage, ingenuity, and collaboration to overcome hardships and challenges. • The settlement of the West threatened the lifestyle and culture of Native American tribes living on the plains. ***and thoughtfully consider the question(s)...*** (Q) • Why do people move? Why did the pioneers leave their homes to head west? • What is a pioneer? • Whose "story" is it?	• infer why the migrants left home to travel West and what pioneers' lives were really like after examining primary and secondary accounts • find and select appropriate information sources about the Westward movement and pioneer life (e.g., in the library and on the Internet) • use pioneer terms and historical facts accurately, in various contexts ***then, the assessments need to include some things like...*** (T) • Create a museum display, including artifacts, pictures, and diary entries, to "answer" the unit's essential ?s. • Imagine that you are an elderly tribal member who has witnessed the settlement of the plains by the "pioneers." Tell a story to your 8-year old granddaughter about the impact of the settlers on your life. (This performance task may be done orally or in writing.) (OE) • Pass a test on basic facts about westward expansion, prairie life, and Native American tribes living on the plains. • Create drawing(s) showing hardships of pioneer life.	help students to: (L) 1. learn about Westward movement and prairie life, 2. empathize with the pioneers and their challenges AND the native tribes whose lands were "settled" 3. show what they have learned by: • reading, viewing and discussing primary & secondary information sources. • reading and discussing relevant literature, such as Little House on the Prairie. • using simulations such as, Oregon Trail 2. • making the big ideas real through experiential activities (e.g., PRAIRIE DAY) near the outset of the unit. Then, discussing and reflecting on the meaning of the experiences. • gathering additional information through research. • showing what an interesting and effective museum display is like. • offering models and providing guided practice in writing letters/journals. • conducting role-plays from the perspective o fNative tribes • providing feedback on the performance/product work in-process.

Structure of Knowledge – Definitions of the Elements



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Structure of Knowledge

Established Goal/Topic: *World War II*

Factual Knowledge

- Hitler's rise to power
- American sentiment before and during the war (isolation vs. intervention)
- appeasement & conflict with Germany
- Pearl Harbor & conflict with Japan
- formation of alliances
- key battles & military strategy
- changes in technologies and warfare
- internment of Japanese during the war
- war's impact on national economy
- terms of surrender

K

Discrete Skills

- take notes
- develop time lines
- read & analyze historical documents
- interpret maps, graphs and charts
- analyze cause/effect
- discuss points of view
- create hypotheses about past and future

S

"big ideas"

Transferrable Concepts

- appeasement
- isolationism
- alliance
- a "just" war
- means vs. end in war (e.g., atomic bomb)
- the "business" of war - economic impact
- "guns vs. butter"

Complex Processes

- historical inquiry
- writing to inform and persuade

Principles and Generalizations

U

- Some wars are considered "just wars" because people believe they must confront an "evil enemy."
- Warfare leads to changes in the way democratic governments relate to their citizens.
- Warfare has economic and technological consequences.
- International conflict often leads to strong disagreements regarding isolation/nationalism and intervention/involvement.

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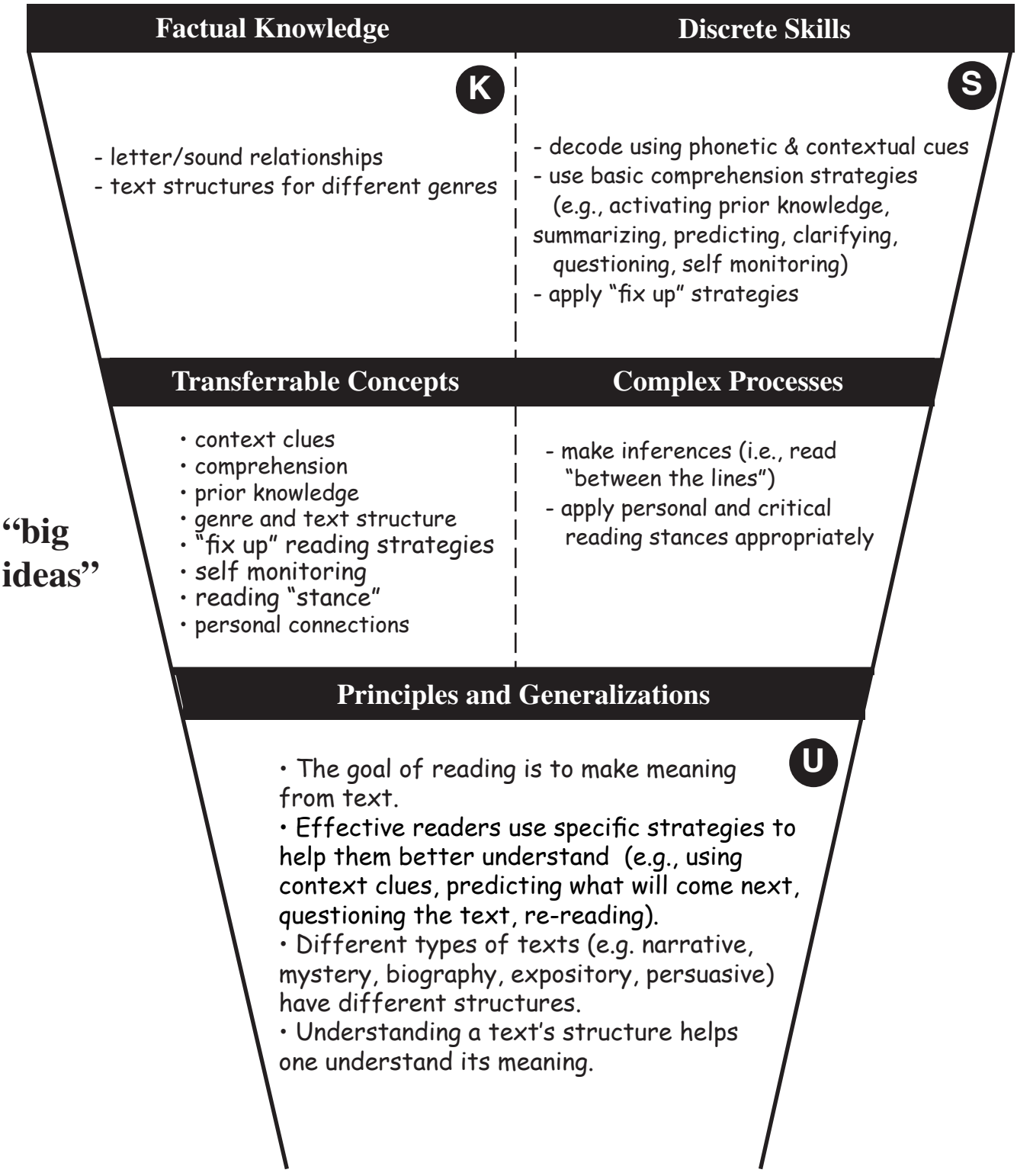
Structure of Knowledge

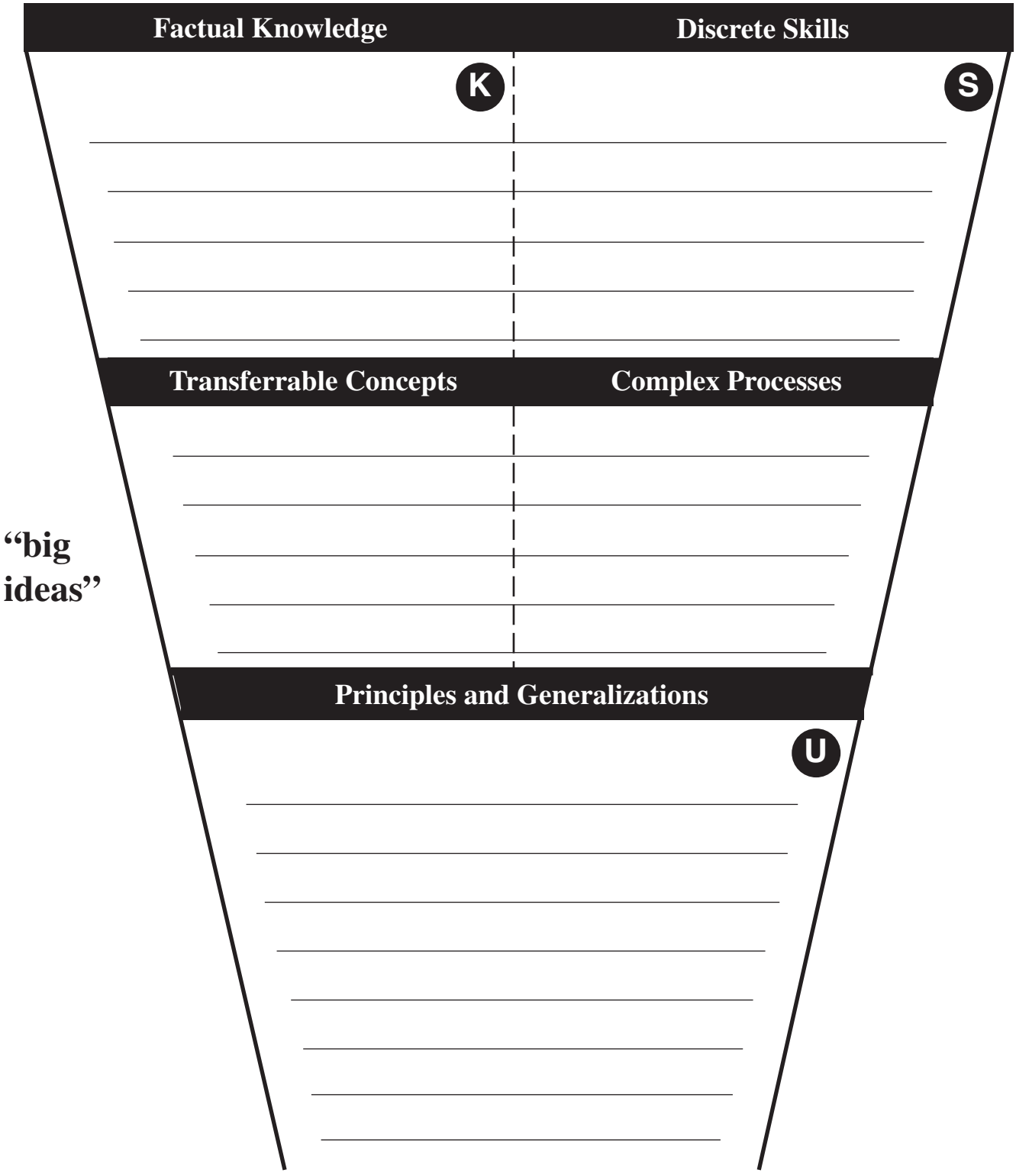
Established Goal/Topic: *reading*



"big ideas"

Structure of Knowledge

Established Goal/Topic:



Concept Attainment – Essential Questions Q

Part 1 - Examine the following examples and non-examples to determine the common characteristics of Essential Questions. List these in the box below.

Essential Questions	Not Essential Questions
1. How are "form" and "function" related in biology?	7. How many legs does a spider have? How does an elephant use its trunk?
2. How do effective writers hook and hold their readers?	8. What is "foreshadowing"? Can you find an example of "foreshadowing'" in the story?
3. Who "wins" and who "loses" when technologies change?	9. What is the original meaning of the term, technology (from its Greek root, "techne")?
4. Should it be an axiom if it is not obvious?	10. By what axioms are we able to prove the Pythagorean theorem?
5. What distinguishes fluent foreigners from native speakers?	11. What are some French colloquialisms?
6. How would life be different if we couldn't measure time?	12. How many minutes are in an hour? How many hours are in a day?

List common characteristics of the Essential Questions:

Part 2 - Use your list of characteristics as criteria to determine which of the following are Essential Questions. Check "yes" or "no" after each example.

	YES	*NO*
13. What is the relationship between popularity and greatness in literature?	___	___
14. When was the Magna Carta signed?	___	___
15. Crustaceans – what's up with that?	___	___
16. Which president of the U. S. has the most disappointing legacy?	___	___
17. What's the pattern?	___	___
18. To what extent are common sense and science related?	___	___

Refine your list of key characteristics of Essential Questions:

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Essential Questions

(examples)

Arithmetic (numeration)
- **What is a number? Why do we have numbers? What if we didn't have numbers?**
- **Can everything be quantified?**

Arts (visual and performing)
- **Where do artists get their ideas?**
- **How does art reflect, as well as shape, culture?**

Culinary Arts
- **When is it o.k. to deviate from the recipe?**
- **What makes a "safe" kitchen?**

Dance
- **How and what can we communicate through the "language" of dance?**
- **In what ways can motion evoke emotion?**

Economics
- **What determines value?**
- **Can macro-economics inform micro-economics (and vice-versa)?**

Foreign Language
- **What distinguishes a fluent foreigner from a native speaker?**
- **What can we learn about our own language and culture from studying another?**

Geography
- **What makes places unique and different?**
- **How does where we live influence how we live?**

Government
- **Who should decide?**
- **How should we balance the rights of individuals with the common good?**

Health
- **What is "healthful" living?**
- **How can a diet be healthy for one person and not another?**

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Essential Questions

(more examples)

History
- **Whose "story" is it? Is history the story told by the "winners?"**
- **What can we learn from the past?**

Literature
- **What makes a "great" book?**
- **Can fiction reveal "truth"? Should a story teach you something?**

Mathematics
- **When is the "correct" answer not the best solution?**
- **What are the limits of mathematical representation/modeling?**

Music
- **How are sounds and silence organized in various musical forms?**
- **If practice makes perfect, what makes "perfect" practice?**

Physical Education/Athletics
- **Who is a "winner?"**
- **Is pain necessary for progress in athletics? ("No pain, no gain" – agree?)**

Reading/Language Arts
- **What makes a great story?**
- **How do you read "between the lines?"**
- **Why do we punctuate? What if we didn't have punctuation marks?**

Science
- **To what extent are science and common sense related?**
- **How are "form" and "function" related in biology?**

Technology
- **In what ways can technology enhance expression/communication? In what ways might technology hinder it?**
- **What are the pros and cons of technological progress?**

Writing
- **Why write?**
- **How do effective writers hook and hold their readers?**
- **What is a "complete" thought?**

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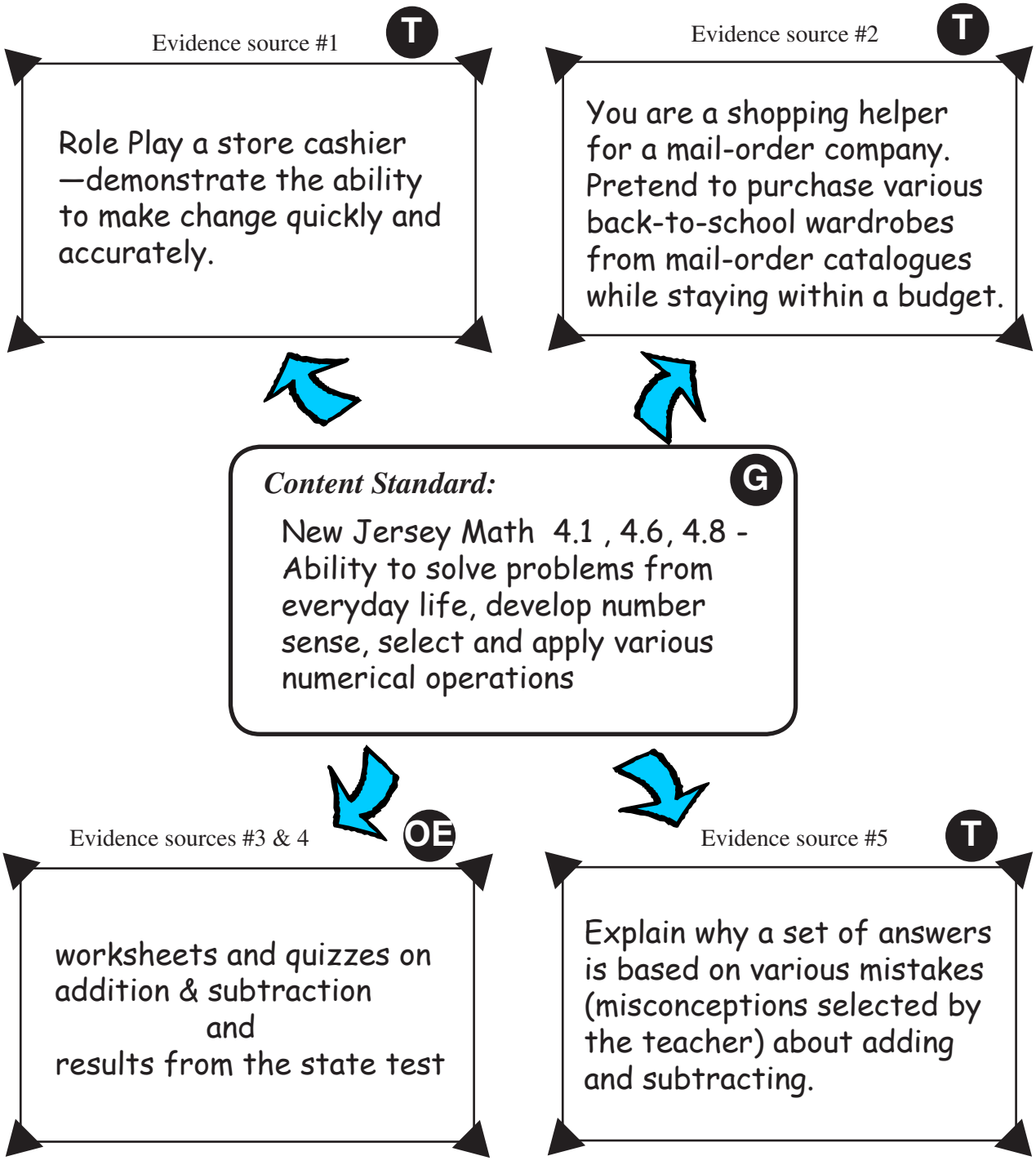
Collecting Sufficient Evidence

(example - mathematics – elementary)

Effective assessment requires multiple sources of evidence – a photo album, not a single snapshot. Use the following worksheet to brainstorm possible sources of evidence of understanding a "big idea" and/ or meeting an established goal such as a designated content standard.



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Sources of Assessment Evidence: Self Assessment

Directions: Use the following scale to rate your "level of use" of each of the following assessment tools (at the classroom, school or district level). What do the survey results suggest? What patterns do you notice? Are you collecting appropriate evidence for *all* the desired results, or only those that are easiest to test and grade? Is an important learning goal "falling through the cracks" because it is not being assessed?

4 = Frequent Use

3 = Use Sometimes

2 = Occasional Use

1 = Do Not Use

_____1. selected-response format (e.g., multiple-choice, true-false) quizzes and tests

_____2. written/oral responses to academic prompts (short-answer format)

_____3. performance assessment tasks, yielding:

____ extended written products (e.g., essays, lab reports)

____ visual products (e.g., Power Point show, mural)

____ oral performances (e.g., oral report, foreign language dialogues)

____ demonstrations (e.g., skill performance in physical education)

_____4. long-term, "authentic" projects (e.g., senior exhibition)

_____5. portfolios - collections of student work over time

_____6. reflective journals or learning logs

_____7. informal, on-going observations of students

_____8. formal observations of students using observable indicators or criterion list

_____9. student self-assessments

_____10. peer reviews and peer response groups

_____11. other: _____

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A Collection of Assessment Evidence

(example - unit on the novel, *Catcher in the Rye* - high school)

Performance Tasks:

T

What's Wrong with Holden? – You are a member of an advisory committee to the hospital where Holden Caulfield is telling his story. After a close reading and discussion of Holden's account of the events of the preceding December, your task is to write: 1) a summary report for the hospital; OR 2) a letter to Holden's parents explaining what is wrong with Holden. You should prepare for a meeting with the parents to explain and justify your analysis of Caulfield's behavior.

Other Evidence:

(e.g., tests, quizzes, prompts, work samples, observations, etc.)

OE

1. Letter - Each student will write a one-page letter describing Holden from the point of view of another character in the novel.
2. Quizzes - 3 quizzes on plot details during the course of the unit
3. Journal - students respond in their journals at the end of each reading assignment to two questions: a) what is the most important thing you learn about Holden in this section of the novel? and b) what is the most important unanswered question about Holden at this point in the novel?

Student Self-Assessment and Reflection:

SA

The final journal entry is a reflection guided by three questions:
1) What changed for you in the way you saw Holden as this book went along?
2) If, as some people claim, "misunderstanding is inevitable," what were your misunderstandings before and during this unit?
3) If you were to teach this novel to next year's students, what would you do to ensure they really understand the novel (rather than simply reading it)?

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Alignment: The Logic of "Backward Design"

(What do the Understandings imply for assessment?)

Stage 1	Stage 2	
If the desired result is for learners to...	***then, you need evidence of the student's ability to...***	***so, the assessments need to include some things like...***
understand that: **U** • Friendship demands honesty and openness. • True friendship is often revealed during hard times, not happy times. • It is sometimes hard to know who your true friends really are.	APPLY: What applications would enable us to infer student understanding of what they have learned? What kinds of performances and/or products, if done well, would provide valid ways of distinguishing between understanding and mere recall?	**T** **OE** • Order a Friend: Order a "true" friend over the phone from a friendship catalog. What qualities should your friend have? • Dear Abby: Give advice in a case where a child told a "white lie" to avoid embarrassing his/her friend. • Develop an informative brochure for younger students to help them know who their true friends are. • Create a comic strip/book to illustrate friendship actions. • Tell or draw a story showing what happens when two friends don't see eye to eye.
and thoughtfully consider the question(s)... **Q** • Who is a true friend? • What makes a friendship last?	EXPLAIN: What must students be able to explain, justify, support, or answer about their work for us to infer genuine understanding? How can we "test" their ideas and applications to find out if they really understand what they have said/done?	• Explain your choices to the salesperson (for the Order a Friend task) • Explain who your friends are and why they are your friends. • Describe the qualities of a "true friend". Justify the qualities you selected. • Respond to quotes about friendship; e.g., "A friend in need is a friend indeed." "The enemy of my enemy is my friend."

Alignment: The Logic of "Backward Design"

(What do the Understandings imply for assessment?)

Stage 1	Stage 2	
If the desired result is for learners to...	***then, you need evidence of the student's ability to...***	***so, the assessments need to include some things like...***
understand that: (U) • Statistical analysis and graphic display often reveal patterns in data. • Pattern recognition enables prediction. • Inferences from data patterns can be plausible but invalid (as well as implausible but valid). • Correlation does not ensure causality.	APPLY: What applications would enable us to infer student understanding of what they have learned? What kinds of performances and/or products, if done well, would provide valid ways of distinguishing between understanding and mere recall?	(T) (OE) • Using past performances in the men's and women's marathon, predict the women's and men's marathon times for 2020. • Chart various scenarios for a savings program (e.g., for college, retirement). Give financial advice. Explain the implausibility of compound interest. • Analyze the past 15 years of AIDS cases to determine the trend. (Note: The data start out looking linear but become exponential.) • Write an article or a letter to the editor about why the marathon analysis is plausible but incorrect. • Develop a brochure to would-be investors on why early saving with small amounts is better than later with large amounts. • Create a graphic display with accompanying written explanation to illustrate the exponential nature of AIDS cases.
and thoughtfully consider the question(s)... (Q) • What's the trend? • What will happen next? • In what ways can data/statistics "lie" as well as reveal?	EXPLAIN: What must students be able to explain, justify, support, or answer about their work for us to infer genuine understanding? How can we "test" their ideas and applications to find out if they really understand what they have said/done?	

Performance Task Examples

Hall of Recognition *– (Social Studies, Language Arts, grade 4-5)*

The state has announced the establishment of a Hall of Recognition to honor the contributions of local citizens to their community, the state or the nation. Since you are learning about famous individuals from _____, you have been asked to nominate a candidate who you believe would be worthy of admission to the Hall.

Your task is to select and research the life of your chosen individual. Submit a nomination letter to the Hall's selection committee explaining the reasons why your candidate should be included Hall of Recognition. Be sure to describe his/her accomplishments and the contributions they he/she has made.

Painting a Schoolroom *- (Mathematics, grades 7-9)*

When contractors give us an estimate on repairs, how can we know if the cost is reasonable? You have been asked by the Principal to review a painting contractor's proposal to determine whether s/he is being overcharged. (Students are given room dimensions and cost figures for materials, labor, and a 20% profit.)

Examine the proposal and write a letter to the Principal providing your evaluation of the proposal. Be sure to show your calculations so that s/he will understand how you arrived at your conclusion.

Mail-Order Friend *– (Language Arts, grades K-2)*

Imagine that you have an opportunity to "order" a friend by telephone from a mail-order catalog. Think about the qualities that you want in a friend. Before you "order" your friend over the telephone, practice asking for three characteristics that you want in a friend and give an example of each characteristic. Remember to speak clearly and loud enough so that the sales person will know exactly what to send.

Tour Director *– (World Languages - Level 2)*

You serve on a Welcome Committee to provide tours for new students. Plan a trip to three *places* (e.g., school, town, mall) in the new student's target language. Incorporate the following vocabulary: *directions* (left, right, near, far, next to, etc.), *places* (e.g., classrooms, cafeteria, gym, library, labs, churches, police and fire stations, schools, restaurants, stores) and *transportation* (e.g., bus, bike, stairs, escalators, taxi, train, car, elevators).

Remember to include a variety of *locations, directions*, and forms of *transportation* on your "trips." Keep sentences simple and narrate in the target language.

Spot Remover *– (Science, middle school)*

Chris wants to decide which of two spot removers is best. First, he tried Spot Remover A on a T-shirt that had fruit stains and chocolate stains. Next, he he tried Spot Remover B on jeans that had grass stains and rust stains. Then he compared the results.

Explain what did Chris do wrong that will make it hard for him to know which spot remover is best. Redesign the experiment to help him determine the best spot remover.

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Constructing a Performance Task Scenario (G.R.A.S.P.S.)

T

Consider the following set of stem statements as you construct a scenario for a performance task. Refer to the previous idea sheets to help you brainstorm possible scenarios. (Note: These are idea starters. Resist the urge to fill in all of the blanks.)

Goal :

- Your task is _____
- The goal is to _____
- The problem/challenge is_____
- The obstacle(s) to overcome is (are) _____

Role:

- You are _____
- You have been asked to _____
- Your job is _____

Audience:

- Your client(s) is (are) _____
- The target audience is _____
- You need to convince _____

Situation:

- The context you find yourself in is _____
- The challenge involves dealing with _____

Product/Performance and Purpose:

- You will create a _____

  in order to _____
- You need to develop _____

  so that _____

Standards & Criteria for Success:

- Your performance needs to _____
- Your work will be judged by _____
- Your product must meet the following standards _____
- A successful result will _____

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T

Constructing a Performance Task Scenario
(G.R.A.S.P.S. - social studies example)

Goal:
- **Your goal is to** help a group of foreign visitors understand the key historic, geographic and economic features of our region.

Role:
- **You are** an intern at the Regional Office of Tourism.

Audience:
- **The audience** is a group of nine foreign visitors (who speak English).

Situation:
- **You have been asked to** develop a plan, including a budget, for a four-day tour of the region. Plan your tour so that the visitors are shown sites that best illustrate the key historical, geographic and economic features of our region.

Product/Performance and Purpose:
- **You need to** prepare a written tour itinerary and a budget for the trip. You should include an explanation of why each site was selected and how it will help the visitors understand the key historic, geographic and economic features of our region. Include a map tracing the route for the tour.
  [Optional: Provide a budget for the trip.]*

Standards & Criteria for Success:
- **Your** proposed tour plan **needs to include**...
  - an itinerary and route map
  - the key historical, geographic and economic features of the region
  - a clear rationale for the selected sites

  *- accurate and complete budget figures

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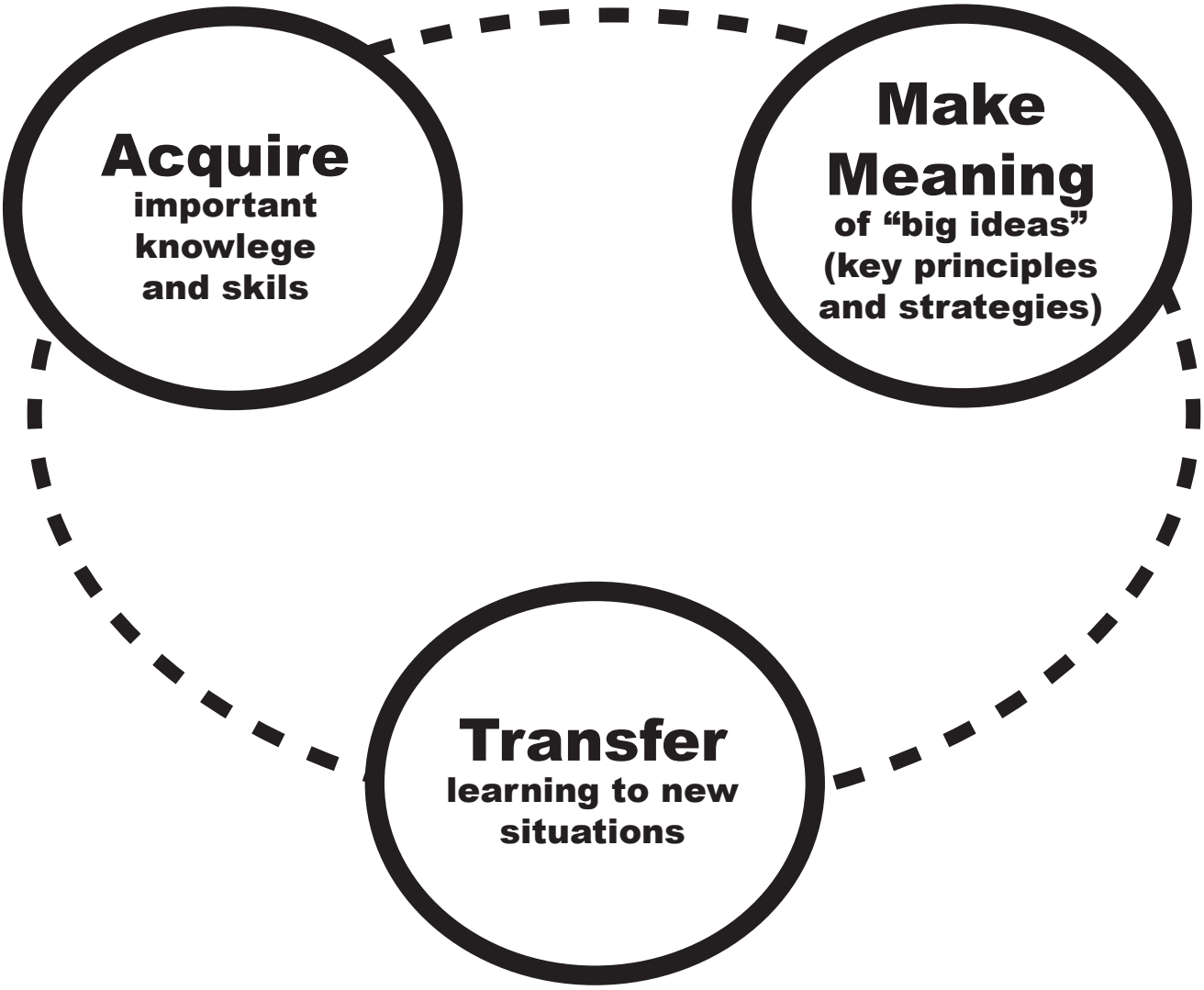
Teaching and Learning for Understanding

What does it mean to teach and learn for understanding?

We have found it useful to consider this question by examining three distinct, yet interrelated, learning goals: 1) acquisition of new information and skill, 2) making meaning of that content (i.e., coming to understand), and 3) transfer of one's knowledge (i.e., applying one's learning to new situations).

These three categories link directly to elements identified in Understanding by Design. In Stage 1 teachers specify the knowledge and skill that they intend students to **acquire**. They also decide upon the "big ideas" they want students to come to understand and develop essential questions to help students **make meaning** of those ideas. In Stage 2, teachers develop performance tasks requiring **transfer** as evidence that students understand and can apply their knowledge in authentic contexts.



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What is Fair?

Who won this year's 7th grade race around the campus?
Every year at Birdsong Middle School, there is an all-class race. Below are the results for the 7th grade (which is made up of four different classes of 7th grade). But there is a problem: no one agrees on who won! One person thinks Class C should win the trophy because they had the 1st runner overall in the race. Another person thinks Class D should win because they had 3 runners come in under 10th place. A third person says: just find the average. But a 4th person said: wait a minute – Class C had way more students in their class than Class D! Averages won't be fair. A 5th person says: use the scoring system in Cross Country – just add up the place of finish of the top 5 and lowest total wins. A 6th person says – unfair! Some classes did well in the first few runners but poorly in the middle! Why should *they* win? Now, everyone is confused and arguing.

What is the most fair solution? Who should win the trophy? Your group, well-known in the school as a group of expert mathematicians (and widely known and respected for your sense of fairness) is being consulted as to who should win the trophy. What will you recommend and why?

Class rank	Class A	Class B	Class C	Class D
1	4	6	1	2
2	9	7	3	5
3	11	10	14	8
4	12	13	18	15
5	20	16	19	17
6	21	22	23	31
7	25	24	28	33
8	26	27	30	36
9	29	34	32	37
10	35	39	41	38
11	43	40	44	46
12	45	42	47	51
13	49	48	50	55
14	54	52	56	57
15	61	53	60	58
16	65	62	63	59
17	69	66	64	67
18	70	72	68	
19	71		73	
20			74	

Notes on the chart:
• The numbers in the chart, from 1 to 74 represent the place of finish of that runner. So, the overall race winner was from Class C, the number two runner overall was in Class D, etc.
• Class rank refers to the rank of finish place in that class, not the overall race. So, the first runner in class A was 4th overall in the race, the 2nd best runner in class A came in 9th overall, etc.
• The blanks reflect the fact that each of the 4 classes has a different number of students. Class D has 20 students, CLASS A has 19 students, etc.

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Stage 3: Instruction and Learning Activities

A = acquiring basic knowledge and skills M = making meaning T = transfer

MATHEMATICS Unit on Measures of Central Tendency

Essential Question: ***What is fair - and how can mathematics help us answer the question?***

1. Introduce and discuss the essential question, first part - What is 'fair'? What is 'unfair'? **M**

2. Introduce the 7th grade race problem. Which 7th-grade class section won the race? What is a fair way to decide? Small-group inquiry, followed by class discussion of answers. **M**

3. Teacher informs students about the mathematical connections derived from the problem analysis, and lays out the unit and its culminating transfer task. **A**

4. In small-group jigsaw, students share their answers to the INQUIRY sheet, then return to their team to generalize from all the small-group work. Discuss other examples related to the concept of "fairness" such as the following. **M**
   - What is a fair way to rank many teams when they do not all play each other?
   - What is a fair way to split up limited food among hungry people of very different sizes?
   - When is it 'fair' to use majority vote and when is it not fair? What might be fairer?
   - Is it fair to have apportioned Representatives based on a state's population, yet have two Senators from each state irrespective of their size? What might be fairer?
   - What are fair and unfair ways of representing how much money the "average" worker earns, for purposes of making government policy?

5. Teacher connects the discussion to the next section in the textbook - measures of central tendency (mean, median, mode, range, standard deviation). **A**

6. Students practice calculating each type of measure. **A**

7. Teacher gives quiz on mean, median, mode from textbook. **A**

8. Teacher leads a review and discussion of the quiz results. **A M**

9. Group task worked on in class: What is the fairest possible grading system for schools to use? **M T**

10. Individuals and small teams present their grading policy recommendations and reasons. **M T**

11. Culminating transfer task: Each student determines which measure (mean, median or mode) should be used to calculate <u>their</u> grade for the marking period and write a note to the teacher showing their calculations and explaining their choice. **T**

12. Students write a reflection on the essential question.

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Learning Goals and Teaching Roles

Three Interrelated Learning Goals →	ACQUIRE	MAKE MEANING	TRANSFER
	This goal seeks to help learners *acquire* factual information and basic skills.	This goal seeks to help students *construct meaning* (i.e., *come to an understanding)* of important ideas and processes.	This goal seeks to support the learner's ability to *transfer* their learning autonomously and effectively in new situations.
Teacher Role/ Instructional Strategies *Note: Like the above learning goals, these three teaching roles (and their associated methods) work together in pursuit of identified learning results.*	Direct Instruction In this role, the teacher's primary role is to *inform* the learners through explicit instruction in targeted knowledge and skills; differentiating as needed. *Strategies include:* ❍ diagnostic assessment ❍ lecture ❍ advanced organizers ❍ graphic organizers ❍ questioning (convergent) ❍ demonstration/modeling ❍ process guides ❍ guided practice ❍ feedback, corrections, ❍ differentiation	Facilitative Teaching Teachers in this role engage the learners in actively processing information and guide their inquiry into complex problems, texts, projects, cases, or simulations; differentiating as needed. *Strategies include:* ❍ diagnostic assessment ❍ using analogies ❍ graphic organizers ❍ questioning (divergent) & probing ❍ concept attainment ❍ inquiry-oriented approaches ❍ Problem-Based Learning ❍ Socratic Seminar ❍ Reciprocal Teaching ❍ formative (on-going) assessments ❍ understanding notebook ❍ feedback/ corrections ❍ rethinking and reflection prompts ❍ differentiated instruction	Coaching In a coaching role, teachers establish clear performance goals, supervise on-going opportunities to perform (independent practice) in increasingly complex situations, provide models and give on-going feedback (as personalized as possible). They also provide "just in time teaching" (direct instruction) when needed. *Strategies include:* ❍ on-going assessment, ❍ providing specific feedback in the context of authentic application ❍ conferencing ❍ prompting self assessment and reflection

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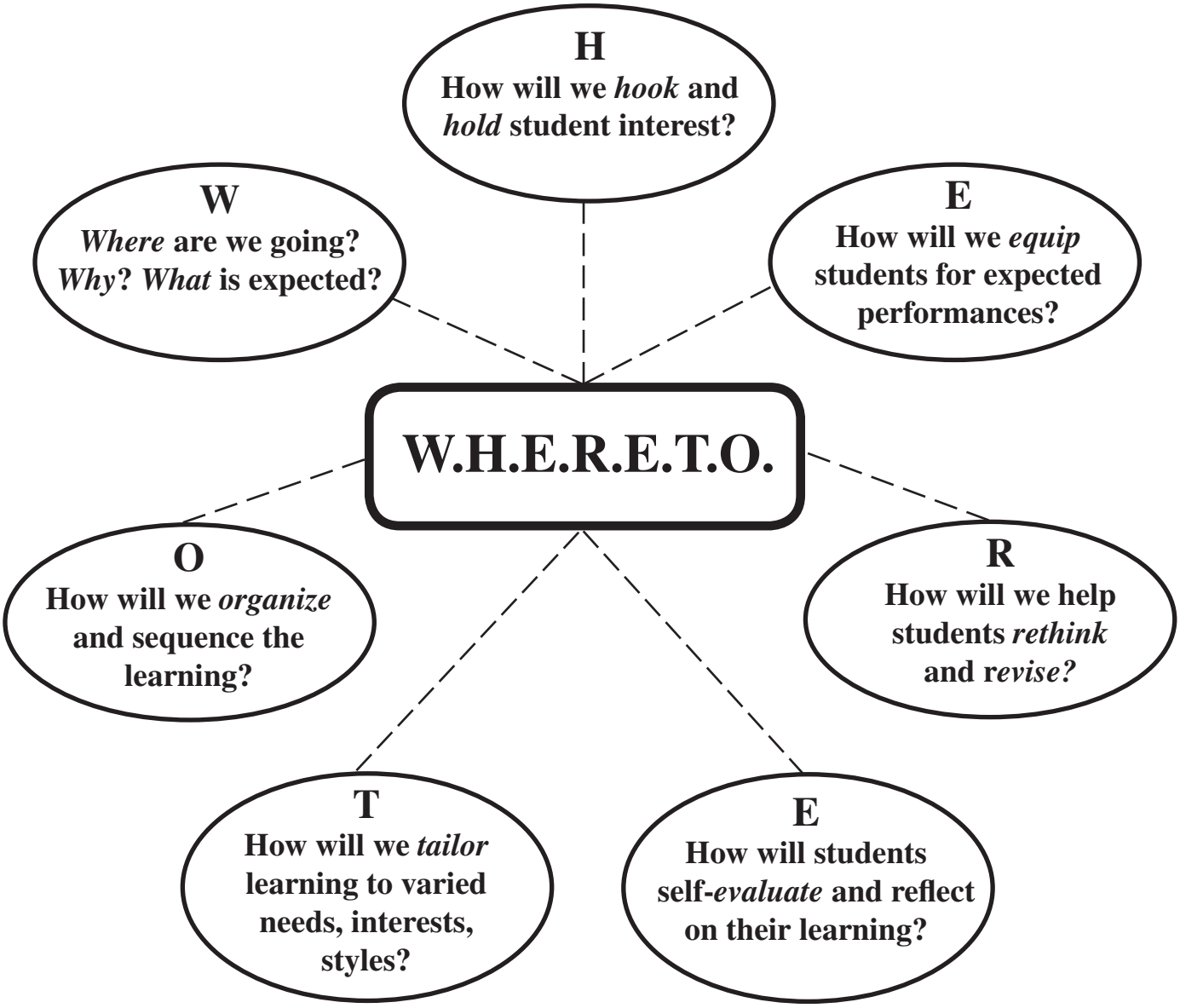
W.H.E.R.E.T.O.
Considerations for the Learning Plan

The acronym W.H.E.R.E.T.O. summarizes the key elements that should be found in your learning plan, given the desired results and assessments drafted in Stages 1 and 2. Note that the elements need not appear in the same order as the letters of the acronym. Think of W.H.E.R.E.T.O. as a checklist for building and evaluating the final learning plan, not a suggested sequence. For example, the learning might start with a Hook (H), followed by instruction on the final performance requirements (W), then perhaps some rethinking of earlier work (R), etc.



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Characteristics of the Best Learning Designs...

(based on surveys of K-16 faculty throughout the world)

Expectations ***the best learning designs...***

- provide clear learning goals and performance expectations.
- cast learning goals in terms of genuine/meaningful performance.
- frame the work around genuine questions & meaningful challenges.
- show models/exemplars of expected performance.

Instruction ***in the best learning designs...***

- the teacher serves as a facilitator/coach to support the learner.
- targeted instruction and relevant resources are provided to "equip" students for expected performance.
- the textbook serves as one resource among many (i.e., text is resource, not syllabus).
- the teacher "uncovers" important ideas/processes by exploring essential questions and genuine applications of knowledge and skills.

Learning Activities ***in the best learning designs...***

- individual differences (e.g., learning styles, skill levels, interests) are accommodated through a variety of activities/methods.
- there is variety in work, methods and students have some choice (e.g., opportunities for both group and individual work).
- learning is active/experiential to help students "construct meaning".
- cycles of *model-try-feedback-refine* anchor the learning

Assessment ***in the best learning designs...***

- there is no mystery as to performance goals or standards.
- diagnostic assessments check for prior knowledge, skill level, and misconceptions.
- students demonstrate their understanding through "real world" applications (i.e., genuine use of knowledge and skills, tangible product, target audience).
- assessment methods are matched to achievement targets.
- on-going, timely, and descriptive feedback is provided.
- learners have opportunities for trial and error, reflection and revision.
- self-assessment is expected.

Sequence & Coherence ***the best learning designs...***

- start with a "hook", immerse the learner in a genuine problem/issue/challenge.
- move back and forth from whole to part, with increasing complexity.
- scaffold learning in "do-able" increments.
- teach as needed; don't over-teach all of the "basics" first.
- revisit ideas – have learners rethink and revise earlier ideas/work.
- are flexible (e.g., respond to student needs; revise plan to achieve goals).

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Synthesizing Activity

Directions:

1. Individually – *Review your handouts, notes, and questions. Identify 2-3 useful and/or interesting ideas gained as a result of attending this session.*

2. With Your Group – *Share your ideas with group members and listen to theirs. Add to your list in the space below.*

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Title: _____ **Subject/Course:** _____

Topic: _____ **Grade(s):** _____ **Designer(s):** _____

Stage 1 – Desired Results

Established Goal(s) G

Understanding(s) U

Students will understand that...

Essential Question(s): Q

Students will know... K

Students will be able to... S

Stage 2 – Assessment Evidence

Performance Task(s) *Summary in G.R.A.S.P.S. form* T

Key Criteria:

Other Evidence OE

2-page Template (1)

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Stage 3 – Learning Plan

Learning Activities:

L

2-page Template (2)

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